NASA TECH BRIEF

NASA Tech Briefs are issued to summarize specific innovations derived from the U. S. space program and to encourage their commercial application. Copies are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Matching Flow Characteristics of Standard Shutoff Valves Eliminates Need for Custom Fabricated Valves

The problem:

Frequently a low pressure fluid system is run through a test program near the upper limit. Test data may dictate that the system pressure be raised substantially so that a complete set of higher pressure valves is needed. To accommodate the test data of the low pressure system, custom valves are usually fabricated to match the flow characteristics of the valves to be replaced. This is a costly and time consuming procedure.

The solution:

Obtain standard off-the-shelf high pressure valves and plot the flow-vs-valve stroke with that of the valves being replaced. The precision of the flow characteristics may depend on the plug profiles, and some correction to the plug contour may be necessary.

How it's done:

Before any testing is done, make certain that both valves have the same type of plug flow characteristic (e.g., same rate of change in flow-vs-valve stroke). Conduct a water flow test on the valve to be replaced and a suitable replacement valve. Plot a curve of flow-vs-valve stroke for each valve and compare. The replacement valve must have a larger flow capacity than the existing valve. Limit the stroke of the replacement valve to provide the same maximum capacity as the existing valve. Restrict the flow of hydraulic fluid to the actuator in the ratio:

$$\frac{\text{Displaced Volume of Replacement Valve Actuator}}{\text{Displaced Volume of Existing Valve Actuator}}$$

to assure that the replacement valve will have the same rate of opening or closing as the valve to be replaced.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10416

Patent status:

No patent action is contemplated by NASA.

Source: A. F. Bevan
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(M-FS-1069)

Category 05

This document was prepared under the sponsorship of the National Aeronautics and Space Administration. Neither the United States Government nor any person acting on behalf of the United States Government assumes any liability resulting from the use of the information contained in this document, or warrants that such use will be free from privately owned rights.